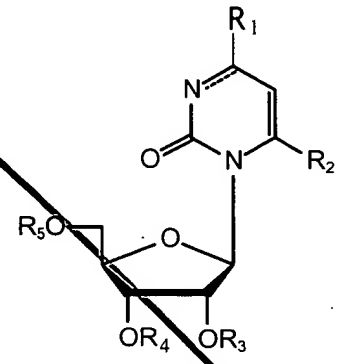
IN THE CLAIMS

Please enter claims 1, 6, 7, 20, 21, 25, 28, 29, 38, 43-46, 54-57, and 62 as rewritten below, and enter new claim 66. In addition, please cancel claims 47-53, 58-61, and 63-65 without prejudice.

1. (Amended) A method for the treatment of a mitochondrial disorder comprising administering to a subject having or at risk of having such disorder an effective amount of a compound of Formula I:

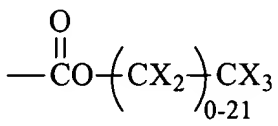


(I)

wherein:

$R_1$ is O, OH, $NHCOCH_3$, or $NH_2$,

$R_2$ is H, $CO_2H$, or



wherein:

each X is independently H or optionally substituted $C_1$-$C_{22}$ alkyl, optionally substituted $C_1$-$C_{22}$ alkenyl, or optionally

substituted $C_1$-$C_{22}$ alkynyl, with substituents selected from the group consisting of H, $C_1$-$C_3$ alkyl, OH, $NH_2$, and halogen,

$R_3$, $R_4$, and $R_5$ are each independently optionally substituted $C_1$-$C_{22}$ alkyl carbonyl, with substituents selected from the group consisting of $C_1$-$C_3$ alkyl, OH, $NH_2$, and halogen, or H, wherein at least one of $R_3$, $R_4$, and $R_5$, are not H,

thereby treating the disorder.

6. (Amended) A method according to claim 1, wherein the mitochondrial disorder is a primary disorder comprising at least one mutation in mitochondrial or nuclear DNA.

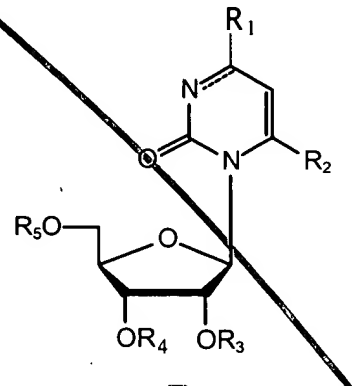
7. (Twice Amended) A method according to claim 1 or claim 2, wherein the mitochondrial disorder is selected from the group consisting of Huntington's disease, Amyotrophic lateral sclerosis, MELAS (Mitochondrial encephalomyopathy with lactic acidemia and stroke-like episodes), MERRF (Myoclonus, epilepsy, and myopathy with ragged red fibers), NARP/MILS (Neurogenic muscular weakness, ataxia, retinitis pigmentosa/Maternally inherited Leigh syndrome), LHON (Lebers hereditary optic neuropathy) "Mitochondrial blindness", KSS (Kearns-Sayre Syndrome), PMPS (Pearson Marrow-Pancreas Syndrome), CPEO (Chronic progressive external opthalmoplegia), Leigh syndrome, Alpers syndrome, Multiple mtDNA deletion syndrome, MtDNA depletion syndrome, Complex I deficiency, Complex II (SDH) deficiency, Complex III deficiency, Cytochrome c oxidase (COX, Complex IV) deficiency, Complex V deficiency, Adenine Nucleotide Translocator (ANT) deficiency, Pyruvate dehydrogenase (PDH) deficiency, Pyruvate carboxylase deficiency, Ethylmalonic aciduria with lactic acidemia, 3-Methyl glutaconic aciduria with lactic acidemia, Refractory epilepsy with declines during infection, Asperger syndrome with declines during infection, Autism with declines during infection, Attention deficit hyperactivity disorder (ADHD), Cerebral palsy with declines during infection, Dyslexia with declines during infection, MNGIE (Mitochondrial myopathy, peripheral and autonomic neuropathy, gastrointestinal dysfunction, and epilepsy),

MARIAHS syndrome (Mitochondrial ataxia, recurrent infections, aphasia, hypouricemia/hypomyelination, seizures, and dicarboxylic aciduria), ND6 dystonia, Cyclic vomiting syndrome with declines during infection, 3-Hydroxy isobutryic aciduria with lactic acidemia, Diabetes mellitus with lactic acidemia, Familial Bilateral Striatal Necrosis (FBSN), Aminoglycoside-associated deafness, Dilated or hypertrophic cardiomyopathy, Wolfram syndrome, Multiple mitochondrial DNA deletion syndromes, and Renal Tubular Acidosis/Diabetes/Ataxia syndrome.

20. (Amended) A method according to claim 19, wherein the co-factor is one or both of Coenzyme Q10 or calcium pyruvate.

21. (Amended) A method according to claim 19, wherein the vitamin is selected from the group consisting of thiamine (B1), riboflavin (B2), niacin (B3), pyridoxine (B6), folate, cyanocobalamine (B12), biotin, α-lipoic acid, and pantothenic acid.

25. (Amended) A method for reducing or eliminating one or more symptoms associated with a mitochondrial disorder comprising administering to a subject in need thereof an effective amount of a compound of Formula I:

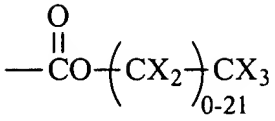



**(I)**

wherein:

$R_1$ is O, OH, $NHCOCH_3$, or $NH_2$,

$R_2$ is H, $CO_2H$, or



wherein:

each X is independently H or optionally substituted $C_1$-$C_{22}$ alkyl, optionally substituted $C_1$-$C_{22}$ alkenyl, or optionally substituted $C_1$-$C_{22}$ alkynyl, with substituents selected from the group consisting of H, $C_1$-$C_3$ alkyl, OH, $NH_2$, and halogen,

$R_3$, $R_4$, and $R_5$ are each independently optionally substituted $C_1$-$C_{22}$ alkyl carbonyl, with substituents selected from the group consisting of $C_1$-$C_3$ alkyl, OH, $NH_2$, and halogen, or H, wherein at least one of $R_3$, $R_4$, and $R_5$, are not H,

thereby treating the disorder.

28. (Amended) A method according to claim 1 or 2, wherein the mitochondrial disorder is selected from the group consisting of MELAS (mitochondrial encephalomyopathy with lactic acidemia and stroke-like episodes), MERRF (myoclonus, epilepsy, and myopathy with ragged red fibers), NARP/MILS (neurogenic muscular weakness, ataxia, retinitis pigmentosa/maternally inherited Leigh syndrome), LHON (Lebers hereditary optic neuropathy, "mitochondrial blindness"), KSS (Kearns-Sayre Syndrome), PMPS (Pearson Marrow-Pancreas Syndrome), CPEO (chronic progressive external opthalmoplegia), Leigh syndrome, Alpers syndrome, multiple mtDNA deletion syndromes, mtDNA depletion syndromes, complex I deficiency, ND6 dystonia, complex II (SDH) deficiency, complex III deficiency, cytochrome C oxidase (COX, complex IV) deficiency, complex V deficiency, adenine nucleotide translocator (ANT) deficiency, pyruvate carboxylase deficiency, and pyruvate dehydrogenase (PDH) deficiency.

29. (Amended) A method for treating or preventing pathophysiological consequences of mitochondrial respiratory chain dysfunction in a mammal comprising administering to said mammal in need of such treatment or prevention an effective amount of a pyrimidine nucleoside.

38. (Amended) A method as in claim 37 wherein said congenital mitochondrial disease is selected from the group consisting of MELAS, LHON, MERRF, MNGIE, NARP, PEO, Leigh's Disease, Alpers syndrome, mitochondrial cytopathy, mitochondrial myopathy, mitochondrial encephalomyopathies, and Kearns-Sayre Syndrome.

43. (Amended) A method as in claim 29 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is selected from the group consisting of renal tubular acidosis, dilating or hypertrophic cardiomyopathy, steatohepatitis, hepatic failure, and lactic acidemia.

44. (Amended) A method for treating developmental delay in cognitive, motor, language, executive function, or social skills in a mammal comprising administration of an effective amount of a pyrimidine nucleoside.

45. (Amended) A method as in claim 44 wherein said developmental delay is a subset of Attention Deficit/Hyperactivity Disorder.

46. (Amended) A method as in claim 44 wherein said developmental delay is a subset of autism associated with mitochondrial dysfunction.

54. (Amended) A method as in claim 29 wherein said pyrimidine nucleoside is selected from the group consisting of uridine, cytidine, an acyl derivative of uridine, an acyl derivative of cytidine, orotic acid, an alcohol ester of orotic acid, or a pharmaceutically acceptable salt thereof.

55. (Amended) A method as in claim 54 wherein said pyrimidine nucleoside is administered orally.

56. (Amended) A method as in claim 29 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is a congenital mitochondrial disease.

57. (Amended) A method as in claim 56 wherein said congenital mitochondrial disease is selected from the group consisting of MELAS, LHON, MERRF, NARP, PEO, Leigh's Disease, Alpers syndrome, and Kearns-Sayre Syndrome.

62. (Amended) A method as in claim 29 wherein said pathophysiological consequence of mitochondrial respiratory chain dysfunction is selected from the group consisting of renal tubular acidosis, dilating or hypertrophic cardiomyopathy, steatohepatitis, hepatic failure, and lactic acidemia.

Please enter new claim 66 as follows:

--66. A method according to claim 1, wherein said mitochondrial disorder is a secondary disorder caused by acquired somatic mutations, physiologic effects of drugs, viruses, or environmental toxins that inhibit mitochondrial function.--